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## 1. INTRODUCTION

### Green FinTech

In recent decades, India's economic growth has surged due to new government economic policies aimed at properly utilizing environmental resources. However, this has led to the over-exploitation of forest resources, causing environmental deterioration and contamination, posing significant challenges to environmental protection and human health. To address this, India is now focusing on channeling resources toward green ecosystems, particularly to support rural community's dependent on local environmental resources.

The high consumption of fossil fuels, which currently meet about 60% of India's energy demands, has significantly contributed to environmental pollution. Researchers and the Indian government are actively working on sustainable development goals, promoting economic growth through eco-friendly methods. Green finance has emerged as a key strategy, funding projects that align with these goals.

Green finance offers various benefits, including operational, investment, and financing support for eco-friendly projects. Despite its growing prominence, its contribution to high-quality economic development remains uncertain. Additionally, Fintech in India has seen rapid adoption, playing a crucial role in the nation's shift to a sustainable financial system. However, there is a gap between the supply and demand for renewable energy funding that needs urgent attention. Addressing this gap will accelerate the growth of green finance, reduce information asymmetry, improve efficiency, and promote sustainable lifestyles, supporting high-quality economic growth and development.

### Banking Sector in India

According to the Reserve Bank of India (RBI), India's banking sector is well-capitalized and highly regulated, ensuring stability and resilience. The country's financial and economic conditions are notably robust compared to other global economies. Studies on credit, market, and liquidity risks indicate that Indian banks have consistently demonstrated resilience, effectively weathering global economic downturns. Advancements in digital banking and FinTech have enhanced operational efficiency, financial inclusion, and the sector's overall capability to manage risks and foster economic growth. The proactive regulatory measures and technological integration are positioning India's banking sector for sustained stability and expansion.

**Customer Experience with Green FinTech**

Customer experience with Green FinTech encompasses how clients interact with and perceive environmentally sustainable financial technologies. It includes evaluating the ease of use, accessibility, and effectiveness of Green FinTech solutions such as eco-friendly banking services and sustainable investment products. Positive customer experiences are driven by a clear understanding of the environmental benefits, user-friendly interfaces, and responsive customer support. Analyzing these experiences helps banks refine their offerings, enhance customer satisfaction, and strengthen their commitment to sustainability.

- ***Customer Perception of Green FinTech***

Customer perception of Green FinTech refers to how clients view and evaluate the environmental benefits, usability, and overall value of sustainable financial technologies and services. It encompasses their attitudes, satisfaction, and trust towards these eco-friendly banking solutions. In the banking sector, understanding customer perception of Green FinTech is crucial for evaluating how effectively these technologies support sustainability while meeting client expectations. Assessing customer views on the environmental benefits and functionality of Green FinTech solutions will provide valuable insights into their adoption and satisfaction levels. This analysis is key to refining green banking services and ensuring they contribute effectively to both sustainable development and customer needs.

- ***Service Delivery of Green FinTech***

Service delivery in Green FinTech refers to the effectiveness and efficiency with which banks provide and manage eco-friendly financial technologies and solutions. It includes the quality of customer support, accessibility, and the seamless integration of sustainable practices into banking services. The rise of Green FinTech has marked a pivotal shift in the financial sector, merging technological innovation with environmental sustainability. In Mumbai, a bustling financial hub, both public and private banks are increasingly adopting Green Fintech solutions to address growing concerns about environmental impact and to meet evolving customer expectations. This study seeks to analyze service delivery regarding Green FinTech initiatives within selected public and private banks in Mumbai. By examining how these institutions integrate sustainable practices into their financial services and the subsequent customer responses, the research aims to provide insights into the effectiveness and reception of Green FinTech. Understanding these dynamics is crucial for banks to enhance their green offerings, improve customer satisfaction, and contribute to broader sustainability goals.

- ***Regulatory Problems and Challenges in Green FinTech***

Regulatory problems in Green FinTech involve navigating complex regulations, including issues with interpretation, clarity, and compliance costs. Banks face challenges in adapting to changing regulations and coordinating with the Reserve Bank of India (RBI) and other authorities. These regulatory hurdles can impact the quality and reliability of Green FinTech services, potentially affecting customer satisfaction. Addressing these challenges is crucial for banks to improve customer experience by ensuring that Green FinTech solutions are compliant, effective, and aligned with customer expectations.

**Adoption of Green FinTech in the Banking Sector**

In the Indian banking sector, green FinTech represents a transformative shift towards integrating sustainability with financial practices. Banks are increasingly adopting green FinTech solutions to drive environmental stewardship while enhancing their service offerings. This integration manifests through various innovative approaches, such as sustainable investment platforms that focus on funding green projects and ESG (Environmental, Social, and Governance) criteria. Indian banks are leveraging these platforms to offer green bonds and ESG-focused funds, enabling investors to support eco-friendly initiatives. Additionally, Green FinTech in Indian banking includes the development of digital tools for tracking carbon footprints and managing carbon credits, which helps both individuals and businesses reduce their environmental impact. Renewable energy projects are also gaining traction through crowdfunding platforms, allowing investors to support clean energy ventures directly. Banks are adopting paperless banking services and eco-friendly credit cards that offer rewards for sustainable spending, further promoting green practices. Moreover, regulatory compliance tools are being utilized to ensure adherence to environmental regulations, enhancing transparency and accountability. While green Fintech in India faces challenges such as data accuracy, market adoption, and regulatory complexities, its potential to drive significant environmental benefits and innovate the banking sector is substantial. As green Fintech continues to evolve, it promises to play a crucial role in aligning India's financial sector with global sustainability goals, fostering a more environmentally conscious and resilient economy.

## 2. STATEMENT OF THE PROBLEM

Despite the increasing prominence of Green FinTech in the financial sector, there is a notable gap in understanding customer perceptions and the effectiveness of service delivery related to these innovative, environmentally-focused financial technologies. In recent years, both public and private banks in Mumbai have adopted Green FinTech solutions to address environmental sustainability through eco-friendly digital banking services, green investment options, and paperless transaction processes. However, there is limited research exploring how customers perceive these Green FinTech initiatives and assessing the quality-of-service delivery associated with them. The core research problem is to investigate how customers view the value and effectiveness of Green FinTech services offered by these banks, and to evaluate whether these services meet customer expectations and contribute to environmental sustainability goals. This study aims to analyze customer satisfaction with Green FinTech services, explore the alignment between customer perceptions and the actual performance of these services, and identify challenges that banks face in delivering effective and environmentally-friendly financial solutions. By comparing the experiences of customers with Green FinTech initiatives at both public and private banks, the research seeks to uncover differences in service quality and customer satisfaction, and provide insights into potential areas for improvement. This research is crucial for understanding how Green FinTech can be enhanced to better meet customer needs and advance the environmental objectives of the banking sector in Mumbai.

## 3. REVIEW OF LITERATURE

**Tarawneh, A., Abdul-Rahman, A., Mohd Amin, S. I., & Ghazali, M. F. (2024)** in their article **"A systematic review of Fintech and banking profitability"** have stated that FinTech, driven by technological innovation, has spurred significant economic growth globally, with notable expansion in user numbers. This systematic review examines the impact of FinTech on bank profitability, evaluating 28 articles from Web of Science and Scopus (August 2019-August 2023) following PRISMA guidelines. The study identifies key themes: FinTech measures at both bank and country levels and profitability determinants, including bank-specific and country-specific factors. Insights highlight the need for robust regulatory frameworks and global collaboration to ensure financial stability, protect consumers, and support the FinTech revolution's integration into banking.

**Bakhshi, P., Agrawal, R., Mendon, S., Frank, D., & Spulbar, C. (2024)** in their article **"Barriers in adoption of FinTech by street vendors and hawkers in India using interpretive structural modelling"** examined barriers to FinTech adoption among street vendors and hawkers in Tier 3 and Tier 4 cities in India using interpretive structural modeling (ISM). Nine key barriers were identified: perceived risk, lack of trust, perceived benefit, social influence, lack of awareness, cash culture, low literacy, perceived ease of use, and lack of financial literacy. The research highlights the need for building trust and increasing awareness through education and outreach programs. It provides insights for policymakers and financial institutions to enhance FinTech adoption and financial inclusion. Limitations include a potentially non-representative sample and reliance on expert opinions.

**Nguyen Thanh, B., Ha, X. S., & Vo, D. T. H. (2024)** In their paper **"Blockchain: The economic and financial institution for autonomous AI?"** have stated that the potential of combining artificial intelligence (AI) and blockchain technology to enable autonomous AI agents to conduct economic and financial transactions independently. It highlights the limitations AI agents face due to restricted access to economic institutions and argues that blockchain can create digital economic structures, enhancing AI's ability to engage in contracts, marketplaces, and financial services. The study suggests that this integration could significantly boost human productivity and emphasizes the need for further research on the economic, societal, and ethical implications of autonomous AI agents operating within blockchain ecosystems.

**Yang, Q., Cui, W., & Wang, X. (2023)** in their paper **"Integrated development of green finance and green accounting in policy banks"** have stated that This study evaluates the effectiveness of China's green credit strategy, focusing on whether businesses that enhance environmental transparency and green innovation receive better bank loan terms. Using a difference-in-differences (DID) model with data from 1,086 publicly traded Chinese manufacturers (2012-2017), the research finds that while improved environmental disclosures do not lead to better financing conditions, green innovations do. The study identifies corporate green-washing—where companies falsely present themselves as environmentally friendly due to lax disclosure standards—as a key issue impacting loan access. The research highlights the need for further investigation into the role of green finance for small and medium-sized enterprises (SMEs), regional variations in green credit policy effects, and the interplay between environmental disclosure, green-washing, and green innovation.

**Ray, S., & Anirudhan, A. (2023)** in their case study **"HDFC Bank's digital transformation journey"** explores HDFC Bank's digital transformation journey, detailing initiatives from 2015, including the 'Go Digital' initiative and the launch of a mobile app. Despite facing technical issues between 2018 and 2021, the bank pursued a technology transformation agenda in June 2021. Significant milestones included the RBI lifting a credit card issuance ban in August 2021, leading to the re-launch of key credit card products and a partnership with Paytm. HDFC Bank aimed to expand its digital payment presence and planned numerous initiatives with sectoral companies to increase its customer base and achieve substantial credit card sales by early 2022.

**Sina, E. S., & Vennila, D. (2023)** in their paper "**The perception of customers towards sustainable practices in Indian banks"** state that Sustainable Development (SD) emphasizes preserving social and natural systems while pursuing economic growth. Financial institutions, particularly banks, play a crucial role in this by integrating sustainable practices. This paper examines customer perceptions of sustainable practices in Indian banks, highlighting the importance of "going green" and responsible corporate behavior. The study found that while customers are increasingly adopting sustainable banking practices, further investigation is needed to fully understand the connection between sustainability and banking in India. This mutual adoption of sustainable practices benefits banks, customers, and the economy.

**Zheng, G.-W., Siddik, A. B., Masukujjaman, M., Fatema, N., & Alam, S. S. (2021)** in their paper **"Green finance development in Bangladesh: The role of private commercial banks (PCBs)"** their study examines green finance (GF) in Bangladesh, focusing on private commercial banks (PCBs) and identifying key challenges to its implementation. It reveals that PCBs are the largest contributors to green finance, and highlights the importance of the economic, social, and environmental dimensions in shaping bankers' perceptions of GF. The study also identifies major barriers, such as high transaction costs and a lack of accountability, and suggests policy recommendations to enhance green finance practices. Future research is encouraged to explore the perspectives of various stakeholders and the impact of GF on banks' environmental performance and profitability.

**Satheesh, M. K., & Nagaraj, S. (2021**) in their paper **"Applications of artificial intelligence on customer experience and service quality of the banking sector"** explores how artificial intelligence (AI) transforms customer experience and service quality in the banking sector. By reviewing existing literature, it highlights AI applications such as credit scoring, fraud

detection, and mobile banking, which streamline processes and enhance customer interactions. AI reduces manual tasks, improves service efficiency, and upgrades security, meeting the growing expectations of tech-savvy customers. As banks integrate these advanced technologies, they not only boost operational efficiency but also strengthen their competitive edge in the digital age.

**Puschmann, T., Hoffmann, C. H., & Khmarskyi, V. (2020)** in their paper **"How green FinTech can alleviate the impact of climate change—The case of Switzerland"** have stated that the financial services industry is undergoing a significant transformation driven by digitization and sustainability, with green FinTech emerging at the intersection of these trends. This study provides a comprehensive overview of green FinTech by systematically analyzing relevant literature and examining the Swiss FinTech landscape. The findings reveal that while green FinTech is gaining traction, it remains under-researched and underdeveloped, especially among established financial institutions. The study identifies key areas for future research, including the development of data standards, the role of green FinTech in digital ecosystems, and the need for international coordination on sustainability initiatives. Despite its early stage, green FinTech holds significant potential for contributing to the achievement of Sustainable Development Goals.

**Park, H., & Kim, J. D. (2020)** in their paper **"Transition towards green banking: Role of financial regulators and financial institutions"** have explored the emerging role of green banking in creating competitive advantages for private banks and expanding central banks' responsibilities in managing financial risks associated with climate change. It discusses the varied approaches between developed and developing countries in implementing green banking initiatives, with private banks increasingly launching green financial products to enhance reputation and seize market opportunities. The paper also highlights the need for further research to evaluate the effectiveness of green banking policies and the relationship between green banking activities and the financial performance of banks.

**Sayed, G., & Sayed, N. S. (2020)** in their paper **"Customer experience with digital banking - A comparative study of private and public sector banks"** have stated that Financial Technology (FinTech) has significantly transformed the Indian financial ecosystem, particularly after the 2008 financial crisis. This study investigates customer perceptions of digital banking, comparing the experiences of private and public sector bank customers. Data from 300 respondents were analysed using statistical tools, revealing that digital transactions

are preferred for their speed and convenience. The study found no significant difference in customer experiences for many services between private and public sector banks. However, private sector banks excelled in areas like mobile banking, online loan applications, and internet banking, suggesting that public sector banks need to enhance their digital services to remain competitive.

**Golubić, G. (2019)** in his article **"Do digital technologies have the power to disrupt commercial banking?"** has examined how digital technologies, particularly through FinTech firms, are disrupting the traditional commercial banking sector. FinTech companies are meeting consumer demands unmet by traditional banks, offering services like crowdfunding and financial inclusion. The lack of adequate regulation poses challenges, yet FinTech's growth and innovation are significant. The paper highlights how FinTech's ability to operate across geographical boundaries and offer new banking solutions may lead to a shift in the banking sector towards online-only models, potentially altering the structure and services of traditional commercial banks.

**Bagla, R. K., & Sancheti, V. (2018)** in their article "**Gaps in customer satisfaction with digital wallets: Challenge for sustainability"** This study investigates the factors driving the popularity of digital wallets in India and the sustainability challenges due to gaps between user expectations and satisfaction with brands like Paytm, Freecharge, Mobikwik, and Oxigen. Based on a survey of 313 respondents in Delhi, it finds that features such as attractive cashback, ease of use, instant transfers, and security contribute to their growing use. However, significant gaps between customer expectations and satisfaction levels threaten the long-term viability of digital wallets. The study highlights the need for improvements in security, interest on wallet balances, acceptability, and transaction costs to ensure sustainability.

**Pamungkas, S., & Kusuma, H. (2017)** in their article **"Initial trust of customers and adoption of mobile banking: An empirical study from Indonesia"** have stated that a lack of trust in electronic channels can delay customer acceptance of technologies like mobile banking. Studies indicate that trust in a bank's electronic channels is crucial for customer adoption. This research surveyed 159 mobile banking adopters and 75 non-adopters, revealing that trust is a key factor driving adoption. Factors such as propensity to trust, structural assurances, and word-of-mouth referrals were found to significantly enhance initial trust in mobile banking. Despite the study's limitations, such as a narrow sample scope, it suggests that future research should explore additional variables and broader respondent demographics.

**Dixit, R. V., Singh, R. N., & Chaturvedi, S. (2017)** in their article **"A study on adoption of mobile wallet for cashless economy"** have stated that following the demonetization of Rs. 500 and Rs. 1000 notes in India on November 8, 2016, there was a significant shift towards electronic payment methods such as mobile wallets, credit cards, and net banking to mitigate cash shortages. The government's push for digital transactions has highlighted the need for a balanced mobile ecosystem. This study examines factors influencing the adoption of mobile wallets and assesses acceptance levels through a survey of 170 respondents. Results indicate significant differences in usage across age groups and education levels, particularly before and after demonetization. Despite challenges like security concerns and technological barriers in rural areas, the study underscores the importance of a robust mobile ecosystem for a sustainable digital future.

**Bharti, M. (2016)** in her paper **"Impact of dimensions of mobile banking on user satisfaction"** explores how various dimensions of mobile banking affect user satisfaction, utilizing Structural Equation Modeling for analysis. It finds that "Supportive Access," which includes factors like knowledge integration and distinct methodology, significantly influences user satisfaction. Conversely, features such as Effective Distinctiveness and Professed Security, common to both mobile and e-banking, did not significantly impact satisfaction. The model's high explanatory power suggests that focusing on enhancing Supportive Access can boost user satisfaction. The study highlights the need for increased awareness and collaboration between banks, mobile service providers, and manufacturers to expand mobile banking's reach and effectiveness. It also points to the potential for further research in different cultural contexts and user segments.

In **Research Methods for Business: A Skill Building Approach, Uma Sekaran and Roger Bougie (2012)** define a moderating variable as one that influences the strength or direction of the relationship between independent and dependent variables. The moderating variable modifies this relationship, providing insights into how and under what conditions the independent variable affects the dependent variable. This concept helps researchers understand the nuanced interactions within their data, emphasizing the importance of including such variables for more accurate and comprehensive analyses.

## Research Gap

This study utilizes existing literature to gain insights into the current landscape within the study's areas of interest, while also exploring relevant theoretical perspectives that contribute to the study's framework.

The following research gaps were identified from the above literature referred:

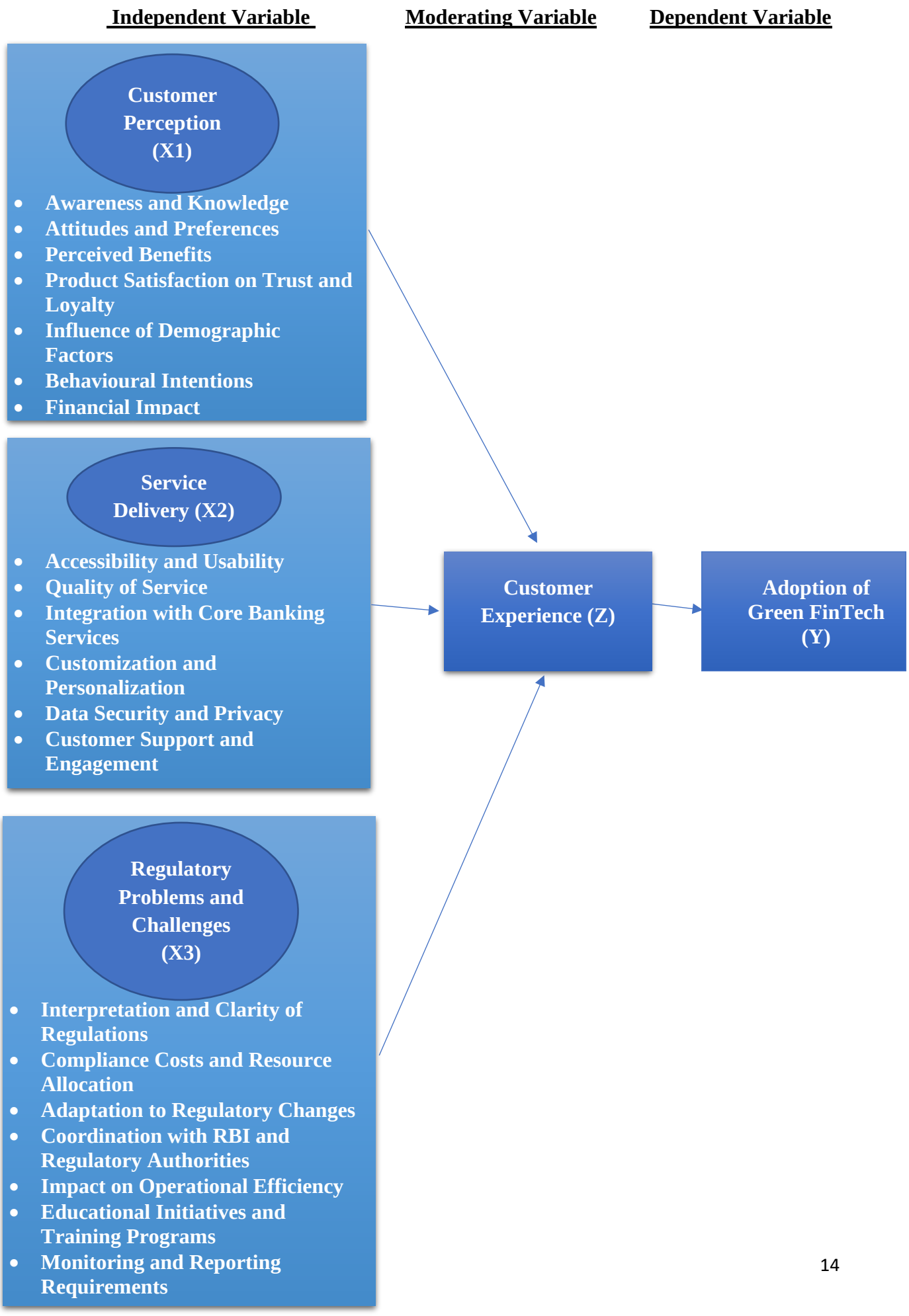
1. Existing studies predominantly focus on general customer experiences in FinTech adoption, but fail to specifically examine the nuances of green FinTech initiatives.
2. There is a lack of research that explores the distinct demographic profiles of customers engaging with green FinTech services within both public and private banks in Mumbai.
3. Literature primarily concentrates on digital transformation broadly in the banking sector, neglecting to delve into the specific impacts and customer perceptions of green FinTech innovations.
4. Current research does not adequately address the full spectrum of customer experience dimensions pertinent to green FinTech, such as satisfaction with sustainability disclosures, usability of green finance apps, and perceived environmental impact.
5. While studies touch upon FinTech innovations in the financial services industry, there is a noticeable absence of comprehensive investigations into how green FinTech specifically influences customer trust and loyalty in Mumbai's public and private banking sectors.

## Theoretical Construct

A construct refers to a concept or characteristic that cannot be directly observed but can be measured by observing other indicators that are associated with it. The framework identifies three primary independent variables: Customer Perception, Service Delivery, and Regulatory Problems and Challenges. Customer Perception encompasses awareness, attitudes, perceived benefits, and financial impacts, which collectively shape customers' views and intentions regarding green FinTech. Service Delivery involves the quality, accessibility, integration, and security of these services, which affect overall customer satisfaction and adoption rates. Regulatory Problems and Challenges address the complexities and costs associated with regulatory compliance, adaptation, and coordination with authorities. The Customer Experience variable moderates these relationships, influencing how effectively the factors impact the adoption of green fintech. Positive customer experiences can enhance the effects of favorable perceptions and service delivery while mitigating the adverse impacts of regulatory

challenges. The framework aims to elucidate how these variables interact and collectively influence the successful implementation and acceptance of green fintech services, guiding hypothesis development and empirical testing in the study.

Despite the importance of these constructs, research on the combined impact of customer perception and service delivery on green FinTech adoption in Indian banks is limited. Most studies focus on individual technological aspects, lacking a comprehensive analysis of why and how digital transformation, particularly green FinTech, affects banking operations and customer experiences. This study aims to fill this gap by examining the influence of customer perception, service delivery and regulatory challenges and problems on green FinTech success in public and private banks in Mumbai. The findings will provide insights into the factors Green FinTech, helping banks meet customer expectations and stay competitive.


Independent Variable
Moderating Variable
Dependent Variable
Customer Perception (X1)
Awareness and Knowledge
Attitudes and Preferences
Perceived Benefits
Product Satisfaction on Trust and Loyalty
Influence of Demographic Factors
Behavioural Intentions
Financial Impact
Service Delivery (X2)
Accessibility and Usability
Quality of Service
Integration with Core Banking Services
Customization and Personalization
Data Security and Privacy
Customer Support and Engagement
Regulatory Problems and Challenges (X3)
Interpretation and Clarity of Regulations
Compliance Costs and Resource Allocation
Adaptation to Regulatory Changes
Coordination with RBI and Regulatory Authorities
Impact on Operational Efficiency
Educational Initiatives and Training Programs
Monitoring and Reporting Requirements
Customer Experience (Z)
Adoption of Green FinTech (Y)

## 4. OBJECTIVES OF STUDY

1. To understand the role of Green FinTech in the Banking Sector.
2. To determine the customer perceptions of Green FinTech adoption in banking.
3. To identify key aspects of service delivery towards Green FinTech.
4. To analyse the customer experience of customer perception and service delivery towards adoption of Green FinTech.
5. To examine the regulatory hurdles in the adoption of Green FinTech.
6. To ascertain the role of stakeholder's adoption of Green FinTech
7. To assess the challenges faced by banks in adapting to regulatory changes.
8. To develop a model and suggest strategies to enhance customer experience towards adoption of Green FinTech in banking.

## IDENTIFICATION OF VARIABLES

Traditionally, banks focused most of their efforts, time, and money on transaction execution, which has now become a very basic feature of their overall service. While providing expedient, consistent, and precise transaction processing ability remains critical, banks can learn from how retailers view customers and adopt a robust and flexible approach in delivering value and experience to their customers, managing, and improving their existing business operations. Green FinTech in banking is a technology-driven change of its existing operating model.

### 1. Independent Variables:

**Customer Perception (X1)**: Customer perception involves understanding how customers view and interact with green FinTech services. It encompasses various aspects that influence their overall perception and satisfaction.

- Awareness and Knowledge
- Attitudes and Preferences
- Perceived Benefits
- Product Satisfaction on Trust and Loyalty
- Influence of Demographic Factors
- Behavioral Intentions
- Financial Impact

**Service Delivery (X2)**: Service delivery refers to how green fintech services are provided to customers. It includes the quality, accessibility, and overall customer experience of using these services.

- Accessibility and Usability

- Quality of Service
- Integration with Core Banking Services
- Customization and Personalization
- Data Security and Privacy
- Customer Support and Engagement

**Regulatory Problems and Challenges (X3)**: Regulatory problems and challenges refer to the issues banks face in complying with regulatory requirements for green fintech services. It includes the interpretation of regulations, compliance costs, and coordination with regulatory authorities.

- Interpretation and Clarity of Regulations
- Compliance Costs and Resource Allocation
- Adaptation to Regulatory Changes
- Coordination with RBI and Regulatory Authorities
- Impact on Operational Efficiency
- Educational Initiatives and Training Programs
- Monitoring and Reporting Requirements

2. **Moderating Variable:**

**Customer Experience (Z)** moderates the impact of Customer Perception (X1), Service Delivery (X2), and Regulatory Problems and Challenges (X3) on the adoption of green FinTech (Y). Positive experiences enhance adoption, while negative experiences can hinder it.

3. **Dependent Variable:**

**Effective Implementation of FinTech (Y)**: Effective implementation of FinTech refers to the successful integration and utilization of green FinTech services within the bank's operations, resulting in improved performance and customer satisfaction.

**Independent Variables:**

**1) Customer Perception (X1):** Customer perception is crucial in determining the adoption and success of green FinTech services. It involves various components that shape how customers perceive and interact with these services.

**Components of Customer Perception:**

1. **Awareness and Knowledge:** Customers' awareness and understanding of green FinTech services.

2. **Attitudes and Preferences:** Customers' attitudes and preferences towards using green FinTech.
3. **Perceived Benefits:** The benefits customers perceive from using green FinTech services.
4. **Product Satisfaction on Trust and Loyalty:** Satisfaction with green FinTech products, leading to trust and loyalty.
5. **Influence of Demographic Factors:** The impact of demographic factors on customer perception.
6. **Behavioral Intentions:** Customers' intentions to use green FinTech services.
7. **Financial Impact:** The financial implications of using green FinTech services for customers.

**2) Service Delivery (X2):** Service delivery is vital for ensuring customer satisfaction and successful adoption of green FinTech services. It includes various components that affect the quality and efficiency of service delivery.

**Components of Service Delivery:**

1. **Accessibility and Usability:** The ease of access and use of green FinTech services.
2. **Quality of Service:** The quality of service provided by green FinTech.
3. **Integration with Core Banking Services:** How well green FinTech integrates with existing banking services.
4. **Customization and Personalization:** The ability to customize and personalize green FinTech services.
5. **Data Security and Privacy:** Ensuring data security and privacy for customers.
6. **Customer Support and Engagement:** The level of customer support and engagement provided.

**3) Regulatory Problems and Challenges (X3):** Regulatory issues and challenges play a significant role in the adoption and implementation of green FinTech services. It includes various components that banks need to address to comply with regulations and ensure smooth operations.

**Components of Regulatory Problems and Challenges:**

1. **Interpretation and Clarity of Regulations:** Understanding and interpreting regulatory requirements.
2. **Compliance Costs and Resource Allocation:** The costs and resources needed to comply with regulations.
3. **Adaptation to Regulatory Changes:** Adapting to changes in regulations.

4. **Coordination with RBI and Regulatory Authorities:** Working with regulatory authorities to ensure compliance.
5. **Impact on Operational Efficiency:** The impact of regulatory compliance on operational efficiency.
6. **Educational Initiatives and Training Programs:** Training programs to educate employees on regulatory requirements.
7. **Monitoring and Reporting Requirements:** Monitoring and reporting to ensure regulatory compliance.

**Moderating Variable**

**Customer Experience (Z)** moderates the relationships between the independent variables and the Adoption of Green FinTech (Y). This variable influences how Customer Perception (X1), Service Delivery (X2), and Regulatory Problems and Challenges (X3) affect the adoption process. Positive customer experiences can strengthen the impact of favorable customer perceptions and effective service delivery on adoption, while mitigating some of the challenges posed by regulatory issues. Conversely, a negative customer experience may weaken these positive effects and exacerbate the difficulties associated with regulatory compliance.

**Dependent Variable:**

**Adoption of Green FinTech (Y):** Effective adoption of FinTech involves successfully integrating green FinTech services within the bank's operations, resulting in improved organizational performance, customer satisfaction, and overall operational efficiency.

## 5. HYPOTHESIS OF STUDY

Objective 1: To understand the role of Green FinTech in the Banking Sector.

Null Hypothesis: ($H1_O$): Banks that actively adopt Green FinTech solutions into their operations will not show greater financial performance compared to those that do not.

Alternate Hypothesis ($H1_A$): Banks that actively adopt Green FinTech solutions into their operations will show greater financial performance compared to those that do not.

Objective 2: To determine the customer perceptions of Green FinTech adoption in banking.

Null Hypothesis: ($H2_o$): Customer perception of Green FinTech offerings in banking does not positively correlates with their awareness and understanding of sustainability issues.

Alternate Hypothesis ($H2_A$): Customer perception of Green FinTech offerings in banking positively correlates with their awareness and understanding of sustainability issues.

Objective 3: To identify key aspects of service delivery towards Green FinTech.

Null Hypothesis: ($H3_o$): Banks that prioritize adoption and user-friendly interfaces for Green FinTech services will not experience higher customer satisfaction levels.

Alternate Hypothesis ($H3_A$): Banks that prioritize adoption and user-friendly interfaces for Green FinTech services will experience higher customer satisfaction levels.

Objective 4: To analyse the customer experience of customer perception and service delivery towards adoption of Green FinTech.

Null Hypothesis: ($H4_o$): There is no significant difference in customer experience regarding customer perception and service delivery towards Green FinTech between public and private sector banks in Mumbai.

Alternate Hypothesis ($H4_A$): There is a significant difference in customer experience regarding customer perception and service delivery towards Green FinTech between public and private sector banks in Mumbai.

Objective 5: To examine the regulatory hurdles in the adoption of Green FinTech.

Null Hypothesis: ($H5_o$): Stringent regulatory requirements do not hinder the widespread adoption of Green FinTech initiatives in both public and private banks.

Alternate Hypothesis ($H5_A$): Stringent regulatory requirements hinder the widespread adoption of Green FinTech initiatives in both public and private banks.

Objective 6: To ascertain the role of stakeholder's adoption of Green FinTech

Null Hypothesis: (H6o): Stakeholder involvement does not significantly affect the adoption of Green FinTech implementation in banks.

Alternate Hypothesis ($H6_A$): Stakeholder involvement significantly affects the adoption of Green FinTech implementation in banks.

Objective 7: To assess the challenges faced by banks in adapting to regulatory changes.

Null Hypothesis: (H7o): Banks that proactively adapt their operational processes and policies to comply with evolving regulatory frameworks for Green FinTech will not demonstrate better long-term sustainability.

Alternate Hypothesis ($H7_A$): Banks that proactively adapt their operational processes and policies to comply with evolving regulatory frameworks for Green FinTech will demonstrate better long-term sustainability.

Objective 8: To develop a model and suggest strategies to enhance customer experience towards adoption of Green Fintech in banking.

Null Hypothesis: (H8o): The development of a model and the suggested strategies will not significantly enhance customer experience towards adoption of Green Fintech in banking.

Alternate Hypothesis ($H8_A$): The development of a model and the suggested strategies will significantly enhance customer experience towards adoption of Green Fintech in banking.

## 6. RESEARCH METHODLOGY

**1) Research Design:** Research Design is the blue print for the entire research process. Research design provides the information about the statistical tools and techniques to be used in conducting the research. The research design used in this study included both Exploratory research design and Descriptive Research Design.

- **Exploratory Research Design**

  Exploratory research design is used in problem identification, identifying the research variables and formulation of hypothesis. The data collection method used in Exploratory Research Design are literature survey, Pilot Survey and Expert Survey.

  Development of research variables for "Customer Experience towards Adoption of Green Fintech at selected Public and Private Banks in Mumbai"

  The dependent variable for the study is:

  Adoption of Green FinTech

  The mediating variable is:

  Customer Experience

  The independent variables are:

  Customer Perception, Service Delivery and Regulatory Problems and Challenges

- **Descriptive Research Design**

  Descriptive Research Design is used to describe the characteristics/ attributes for the respondents with reference to customer perception factors like (Awareness and Knowledge, Attitudes and Preferences, Perceived Benefits, Product Satisfaction on Trust and Loyalty, Influence of Demographic Factors, Behavioral Intentions, Financial Impact) Service delivery factors like (Accessibility and Usability, Quality of Service, Integration with Core Banking Services, Customization and Personalization, Data Security and Privacy, Customer Support and Engagement) Regulatory problems and challenges factors like (Interpretation and Clarity of Regulations, Compliance Costs and Resource Allocation, Adaptation to Regulatory Changes, Coordination with RBI and Regulatory Authorities, Impact on Operational Efficiency, Educational Initiatives and Training Programs, Monitoring and Reporting Requirements) for customers will be assessed. Through descriptive research, the opinions of the respondents will be collected to analyse the Adoption of Green FinTech in the Public and Private sector banks in Mumbai.

Cross sectional research design has been used as a type of descriptive research design as the research will be conducted only once regarding the customer perception, service delivery and regulatory problems and challenges. The statistical tools like Simple Percentage Method, Spearman Rank Correlation, Chi-square test, Reliability Analysis, Multiple Regression, Factor Analysis and Structural Equation Modeling (SEM) will be used to derive conclusions for the study.

**2) Data Collection**: The researcher will collect the data by using both primary data as well as secondary data.

**a) Primary data** collection method and structured questionnaire using survey method will be used and data collection techniques will assist to bring the real insight to understand the research problem at various levels.

Quantitative type of research will be applied by using the questionnaire, testing on a population of deposit holders of Banks in Mumbai.

Before conducting the actual research, pilot testing will be done by taking 15-20 deposit holders for the purpose of checking the reliability of the questionnaire. Hence, the primary data on dependent and independent variables will be collected.

**b) Secondary data** will be collected from various sources like websites, newspapers, reference books and journals.

**3) Questionnaire Design:** The questionnaire will be designed by using both measurement and rating scales. The measurement scales include nominal scale, ordinal scale and interval scale. Nominal scale has been used to understand the profile of the respondents like type of bank, age, experience, marital status, education, gender and salary.

Ordinal scale is a ranking scale used to rank the attributes for Green FinTech. Interval scale is used as an attitude measurement scale on 1 -5, 1 = Extremely unimportant to 5 = Extremely important. In this study, interval scale is used to determine customer experience (customer perception, service delivery and regulatory challenges and problems) on effective adoption of Green FinTech.

Likert rating scale is used as a rating scale used to indicate the agreement or disagreement on a series of statements related to customer perception, service delivery and regulatory challenges and problems and Green FinTech on 1 – 5, 1 being Strongly disagree and 5 being Strongly agree.

**4) Sample Design:**

**a) Total Population**: The population for this study is the total deposit holders of banks in Mumbai.

| Type of Bank | Number (In India) |
|---|---|
| Public Sector Banks | 12 |
| Private Sector Banks | 21 |
| Local Area Banks | 2 |
| Small Finance Banks1 | 11 |
| Payments Banks | 6 |
| Financial Institutions | 4 |
| Regional Rural Banks | 43 |
| Foreign banks | 45 |

Source: https://rbi.org.in/commonman/English/Scripts/BanksInIndia.aspx

**b) Sample Size**: The top five banks with regards to market capitalization as on August 01, 2024

| Public Banks | Private Banks |
|---|---|
| SBI | HDFC Bank |
| Punjab National Bank | ICICI Bank |
| Bank of Baroda | Axis Bank |
| Indian Overseas Bank | Kotak Mahindra |
| Union Bank of India | IndusInd Bank |

Source: https://www.forbesindia.com/article/explainers/top-10-banks-india-by-market-cap/87913/1

The Sample size out of the total population would be 800 deposit holders of the banks in Mumbai.

**Cochran's (1977)**

Cochran's formula is widely used in survey research to determine an appropriate sample size when estimating population parameters.

Cochran's formula for sample size calculation is:

$$n_0 = \frac{Z^2 * p * (1-p)}{e^2}$$

where:

- $n_0$ = required sample size
- Z = Z-value (the number of standard deviations from the mean corresponding to the desired confidence level)
- p = estimated proportion of the population with the attribute of interest
- e = desired level of precision (margin of error)

Assuming:

- Confidence level = 95% (Z = 1.96)
- Estimated proportion p = 0.5
- Margin of error e = 0.05

The formula becomes:

$$n_0 = \frac{(1.96)^2 * 0.5*(1-0.5)}{(0.05)^2}$$

$$n_0 = \frac{3.8416 * 0.25}{0.0025}$$

$$n_0 = \frac{0.9604}{0.0025}$$

$n_0$=384.16

As the population is heterogeneous in nature and the variability is very high Cochran's (1977) formula is used to determine the sample size. = 384

**Glenn (1992)**

As population is more than 1,00,000 so Glenn (1992) will be 400 at confidence level of 95%. The determination of an appropriate sample size is a critical aspect of any research study, ensuring the reliability and validity of the results. In this study, we have chosen a sample size of 400. This decision is grounded on the guidelines provided by Glenn (1992), which offer a clear framework for sample size determination based on the population size and desired confidence level.

$$N = \frac{Z^2 * p * (1-p)}{E^2}$$

where:

- Z is the Z-score, corresponding to the desired confidence level. – 95% (Z= 1.96)
- p is the estimated proportion of the population (if unknown, 0.5 is used as it maximizes the sample size) = 0.5
- E is the margin of error = 0.05
- Population size: N>1,00,000

$$n_0 = \frac{1.96^2 * 0.5 * (1-0.5)}{0.05^2}$$

$$= \frac{3.8416 * 0.25}{0.0025}$$

$$= 384.16$$

Since the population size N is very large, the finite population correction factor is close to 1, and $n_0 \approx 384$

Even though the calculation indicates a sample size of approximately 384, in this research 800 will be the sample size to ensure greater reliability and robustness in the results. (400 from Public Banks and 400 from Private sector are likely to be collected)

**c) Sampling Unit**: Deposit holders

**d) Sampling Technique**: A non-probabilistic sampling technique.

**e) Sampling Method:** Snowball Sampling, Convenience and Quota sampling techniques will be applied to select the sample size of 800 deposit holders. Snowball sampling is also called as referral sampling. Based on the available references of the initial deposit holders, the subsequent information about the remaining deposit holders will be obtained. After obtaining the information about the deposit holders from the available references through snowball sampling, convenience sampling will be used to identify the respondents who are readily available and willing to share the information about customer experience, adoption and implementation of Fintech. Moreover, convenience sampling reduces non-response errors. A fixed quota of 400 depositors from public banks and 400 depositors from private banks will be chosen by quota sampling. Owing to the population's high degree of variability and heterogeneity,

non-probability sampling techniques including quota, snowball, and convenience sampling were used to determine the sample size of 800 respondents.

**f) Research Area:** The research area has been from Central, Western, Harbour and Mumbai City to derive the adoption of Green Fintech on customer experience.

**5) Statistical Tools:**

In the research the tools like, simple percentage method, Spearman rank correlation, Chi-square test, Reliability Analysis, Multiple Regression, Factor Analysis and Structural Equation Modeling (SEM) will be used to test the equations of multiple regressions simultaneously.

a) The Simple Percentage Method has been employed, using percentages to determine the relationships between data series.

b) Spearman Rank Correlation is a non-parametric statistical tool used to assess the strength and direction of the relationship between two ranked variables. It evaluates how well the relationship between two variables can be described using a monotonic function.

c) Chi-square test also known as the goodness-of-fit test, is used to determine how the observed frequencies differ from the expected frequencies. When applied to two variables, the Chi-Square test assesses the symmetric association between them.

d) Factor Analysis is a multivariate analysis technique used to simultaneously evaluate multiple variables. It is employed for data reduction and data summarization.

e) Reliability Analysis has been conducted to assess the internal consistency of the variables. Factor Analysis, a multivariate analysis technique, has been utilized to evaluate the variables simultaneously.

f) Multiple Regression Analysis is used to evaluate the impact of independent variables on a dependent variable. This method enables researchers to measure the strength of the relationship between an outcome (the dependent variable) and several predictor variables, as well as to determine the significance of each predictor within the relationship, often accounting for the influence of other predictors statistically.

g) Structural Equation Modeling (SEM) has been utilized to simultaneously test multiple regression equations.

## 7. SIGNIFICANCE OF STUDY

The study on customer perception and service delivery towards Green FinTech initiatives in selected public and private banks in Mumbai is of significant importance for several reasons. First and foremost, it addresses a critical gap in the understanding of how customers perceive and accept Green FinTech services. As financial institutions increasingly adopt green technologies to meet environmental sustainability goals and appeal to eco-conscious consumers, understanding customer perceptions of these initiatives is essential for their successful implementation and widespread adoption. This research will offer valuable insights into how customers view the effectiveness of Green FinTech services, including their perceptions of usefulness and ease of use, which are fundamental factors influencing technology acceptance.

By assessing dimensions such as reliability, responsiveness, assurance, empathy, and tangibles, the study will provide a detailed analysis of how well banks meet customer expectations and identify potential areas for improvement in the delivery of Green FinTech services. This evaluation is crucial for enhancing the quality of these services and ensuring that they align with both customer needs and environmental sustainability objectives.

Understanding how attitudes, subjective norms, and perceived behavioral control affect customers' intentions to use Green FinTech services can inform strategies for increasing adoption rates and fostering a culture of sustainability within the banking sector. These insights can guide banks in designing more effective marketing strategies and educational initiatives that address customer concerns and promote the benefits of Green FinTech solutions.

Finally, by incorporating the Sustainability Theory, the study will evaluate how Green FinTech initiatives contribute to long-term environmental sustainability while balancing economic and social impacts. This aspect of the research is significant as it helps banks measure the broader environmental benefits of their Green FinTech initiatives and aligns these benefits with global sustainability goals. The findings will be valuable for policymakers, financial institutions, and environmental advocates seeking to enhance the effectiveness of green financial practices and achieve meaningful environmental outcomes.

In summary, the significance of this study lies in its potential to bridge gaps in existing knowledge about customer perceptions of Green FinTech, evaluate the effectiveness of service delivery, inform strategies for increasing adoption, and assess the environmental impact of these initiatives. The research outcomes will provide actionable insights for banks aiming to improve their Green FinTech services and support the achievement of both customer satisfaction and sustainability objectives in the financial sector.

## 8. SCOPE OF STUDY

The scope of this study is comprehensive and focused on several key areas. Geographically, the research is concentrated on Mumbai, a major financial center in India, and will include both public and private sector banks operating within the city. This dual focus allows for a comparative analysis of how different types of banks are implementing and managing Green FinTech initiatives. The study specifically targets Green FinTech solutions offered by these banks, such as sustainable investment products, carbon tracking tools, and eco-friendly banking services. It aims to evaluate customer perceptions, including their awareness, satisfaction, and perceived value of these Green FinTech offerings. Additionally, the research will consider demographic factors such as age, income, and education to understand how these variables influence customer perceptions. On the service delivery front, the study will assess the quality of Green FinTech services provided by the banks, focusing on efficiency, accessibility, and customer support. By examining these dimensions, the study seeks to provide a thorough understanding of both customer attitudes and the effectiveness of service delivery in the context of Green FinTech.

Benefit of Green FinTech to the stakeholders

1. Customers: Customers benefit from cost savings, increased environmental awareness, and access to sustainable investment options. This research will help banks understand customer needs and improve Green FinTech services to enhance satisfaction and adoption rates.
2. Banks: Banks gain enhanced brand image, customer loyalty, regulatory compliance, and operational efficiency. The research will provide insights into improving service delivery and identifying successful Green FinTech strategies.
3. Shareholders: Shareholders benefit from long-term profitability and positive public perception. The study will offer data on the impact of Green FinTech initiatives on bank performance, informing better investment decisions.
4. Employees: Employees experience increased job satisfaction and skill development opportunities. Research insights will help banks enhance employee engagement and training in Green FinTech technologies.
5. Regulators and Policymakers: Green FinTech supports environmental goals and innovation in the financial sector. The study will provide empirical data to help craft effective policies and regulatory frameworks.

6. Community and Society: Society benefits from a reduced environmental footprint and increased sustainability awareness. Research findings will promote public engagement and support for Green FinTech initiatives.
7. Suppliers and Partners: Suppliers and partners are encouraged to adopt sustainable practices, fostering greener supply chains. The research will offer insights into aligning partnerships with Green FinTech goals and enhancing collaboration.

By analyzing the benefits to these stakeholders and how the research contributes to their interests, the study aims to provide a holistic view of the impact and value of Green FinTech in the banking sector in Mumbai.

## 9. LIMITATIONS OF STUDY

1) The details, facts and figures collected for this research might reveal variations, as the nature and extent of variants in the performance of different types of banks may are different.
2) The study focuses only on few of the variables that can impact the customer perception and service delivery. The other variables are not considered in the study.
3) The primary data studied in the research is limited to the deposit holders in Mumbai and the information will be collected from those respondents who are willing to share the information.
4) The sample size is affected by the high level of variability.
5) The study can't be exactly incorporated as there can be various environmental factors that affect the banking statements like the legal environment, socio-cultural environment, technological environment and political environment.
6) Data collection may be affected by the confidentiality of the information provided by the respondents.

## TENTATIVE CONCLUSION

In conclusion, this study aims to provide a comprehensive analysis of the interplay between customer perception, service delivery, and the integration of green FinTech within the banking sector in Mumbai. By examining the role of green FinTech in promoting environmental sustainability, and evaluating its impact on customer perceptions and service delivery, this research will shed light on the critical factors driving successful green FinTech adoption in both public and private banks. The analysis will address key aspects of service delivery, regulatory challenges, and the banks' ability to adapt to evolving regulatory frameworks. It is anticipated that the findings will reveal significant correlations between the extent of green FinTech integration and improvements in customer satisfaction and service quality. Furthermore, the study will offer valuable insights into the regulatory hurdles faced by banks and propose actionable strategies to enhance service standards through green FinTech. By developing a model that incorporates these variables, this research seeks to contribute to the academic discourse on green FinTech, inform policy-making, and provide practical recommendations for banks aiming to leverage green FinTech to achieve both environmental and operational excellence. This research will thus advance the understanding of green FinTech's impact on the banking industry and provide a foundation for future studies in this emerging field.

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